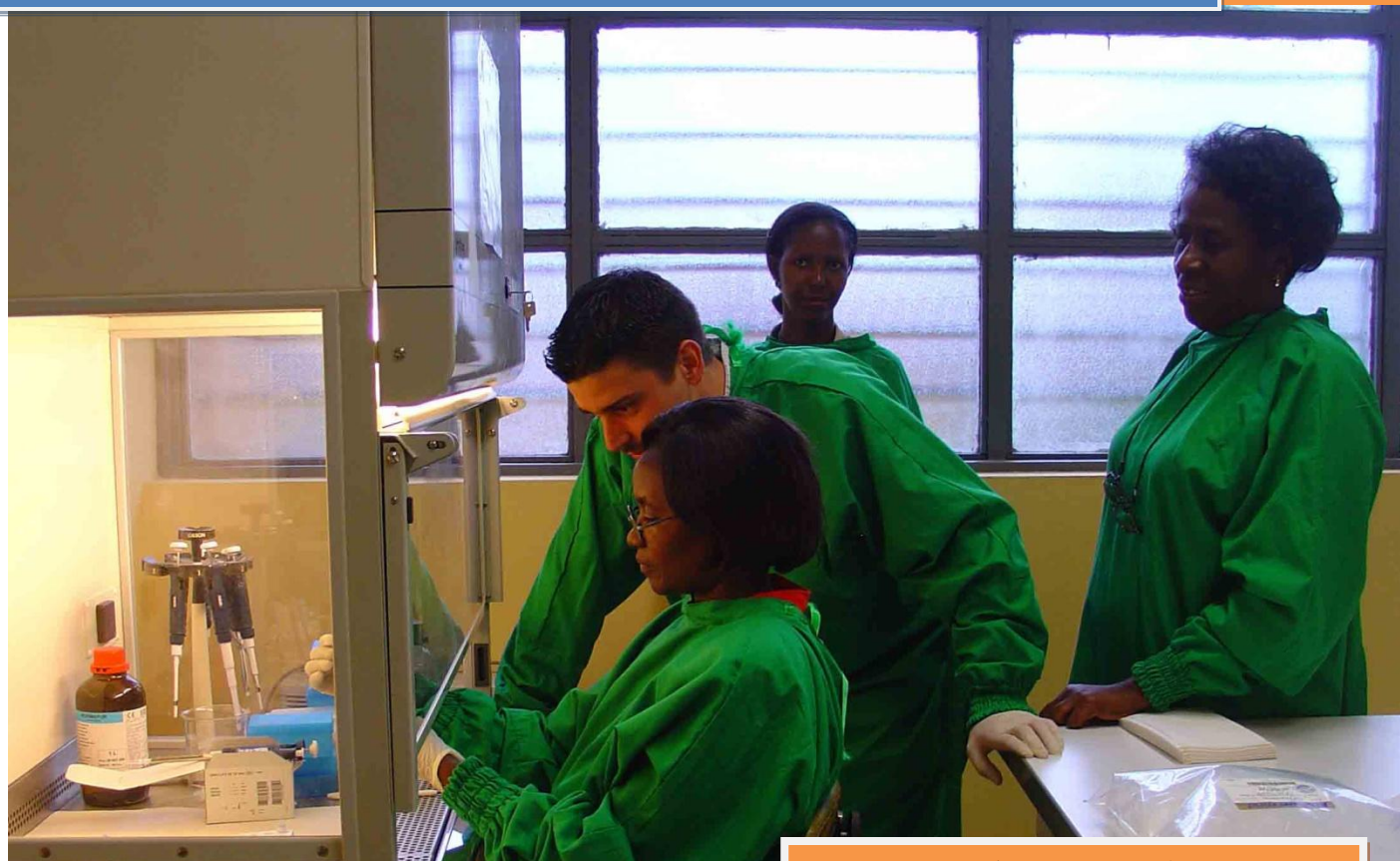


2010

# TUBERCULOSIS INITIATIVE



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## OBJECTIVES OF THE TB INITIATIVE

The primary objective of the Tuberculosis (TB) Initiative of the Millennium Villages Project (MVP) is to assist local teams in reducing the impact of TB. We hope to accomplish this by improving case detection rates and increasing treatment success rates in order to eventually decrease transmission and case-fatality rates.

**Goal 1:** Implement a comprehensive, patient-centered, TB infrastructure (diagnosis → treatment) at the local level

**Goal 2:** Integrate TB and HIV activities

**Goal 3:** Reduce the transmission of TB and the mortality associated with TB

**Goal 4:** Tackle multidrug-resistant tuberculosis (MDR-TB)

The following two Millennium Development Goals (MDGs) indicators are used to evaluate the effectiveness of the TB initiative:

1. **Indicator 6.9 (formerly indicator 23):** TB Prevalence<sup>1</sup> and death rates associated with TB;
2. **Indicator 6.10 (formerly indicator 24):** Proportion of TB cases detected and cured<sup>2</sup> under DOTS (TB treatment).

<sup>1</sup> A change in prevalence cannot be and will not be monitored in any of the MVP sites because of the 5-year duration of the project (deemed too short by WHO to record a noticeable decrease in TB prevalence) and the small size of the clusters.

<sup>2</sup> For the purpose of monitoring the TB initiative at MVP, we will use the WHO definition of “*success*” rather than this more restrictive notion of “*cure*”. **Cure** refers specifically to patients who have successfully completed their 6 (or 8) months DOTS treatment and whose sputum is confirmed negative at the end of therapy. **Completed** refers to patients who have completed their 6 (or 8) months DOTS treatment, but whose sputum was not or could not be confirmed negative at the end of therapy. WHO defines **success** as the patients who are either cured or have completed therapy. In all the MVP sites, the TB initiative will make all efforts to systematically check the final sputum and progressively eliminate the “completed” category.

**Tuberculosis and HIV in the 10 countries of the MVP**

The TB initiative relies on national figures reported by each country's national TB programme to WHO for baseline assessment of TB prevalence and incidence, since the sample size within all MVP clusters is too small to monitor these statistics locally for each site. The national figures will be used to calculate the case detection rate based on the expected number of cases in each site.

TB/HIV co-infection is a salient public health concern. Untreated, a TB/HIV co-infected individual has a life expectancy of 5 weeks. The HIV prevalence and TB/HIV co-infection rates per country can be useful in the assessment of treatment outcomes in sites with populations that are particularly at risk.

<b>Country</b>	<b>Incidence*</b>	<b>HIV prevalence (15-49 yo)</b>	<b>TB/ HIV coinfection</b>
<b>Ethiopia</b>	163	2-6.7%	19%
<b>Ghana</b>	88	1.9-5%	16%
<b>Kenya</b>	142	7.4%	48%
<b>Malawi</b>	132	11.3-17.7%	68%
<b>Mali</b>	138	1.5-2%	17%
<b>Nigeria</b>	131	3.6-8%	27%
<b>Rwanda</b>	164	3.4-7.6%	37%
<b>Senegal</b>	119	1-1.4%	13%
<b>Uganda</b>	136	2.8-6.6%	39%
<b>Tanzania</b>	120	6.4-11.9%	47%

\* Shows the incidence of smear positive TB cases per 100,000 inhabitants.

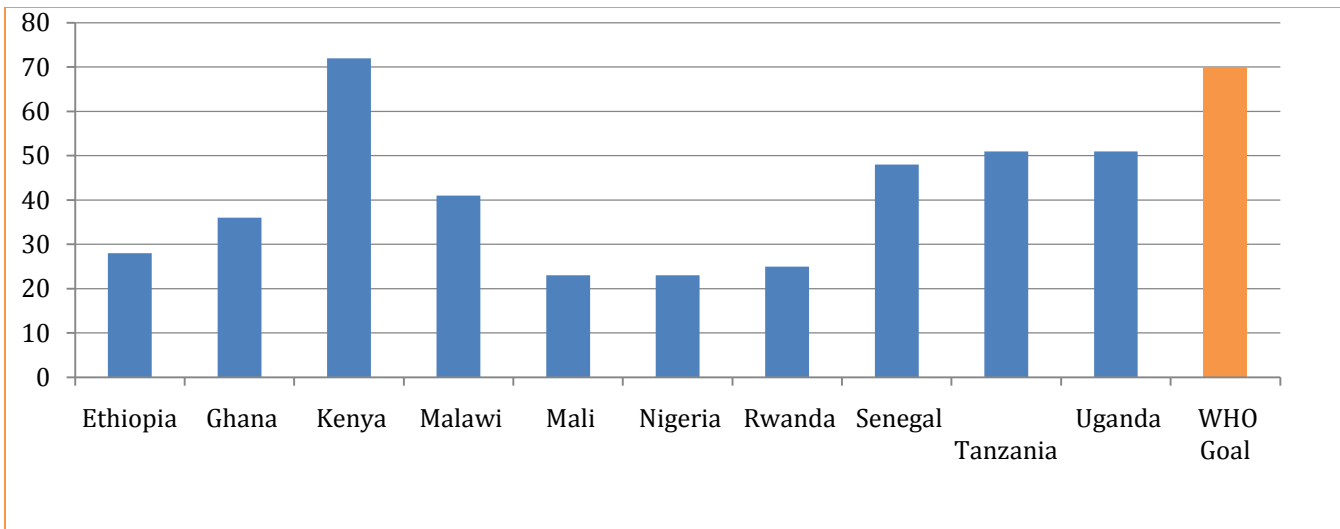
**Diagnosis of TB in the 10 countries of the MVP (indicator 6.9)**

Case detection rates for countries hosting the MVP demonstrate the long road ahead for TB control and elimination: while **the WHO target is for countries to detect 70% of TB cases** (based on the estimated number of smear positive cases expected each year). In 2007 only one of the 10 countries (Kenya) had reached that goal (latest WHO data available in 2009).

For MVP sites, a successful TB initiative will reach two specific targets:

1. Achieve a case detection rate that is higher than the national average
2. Reach the WHO target of 70% case detection rate (or higher)

National Case Detection Rates for MVP Countries, 2008



$$\text{Case Detection Rate} = \frac{\text{Number of cases detected by the site}}{\text{Number of expected cases for the site}} \times 100$$

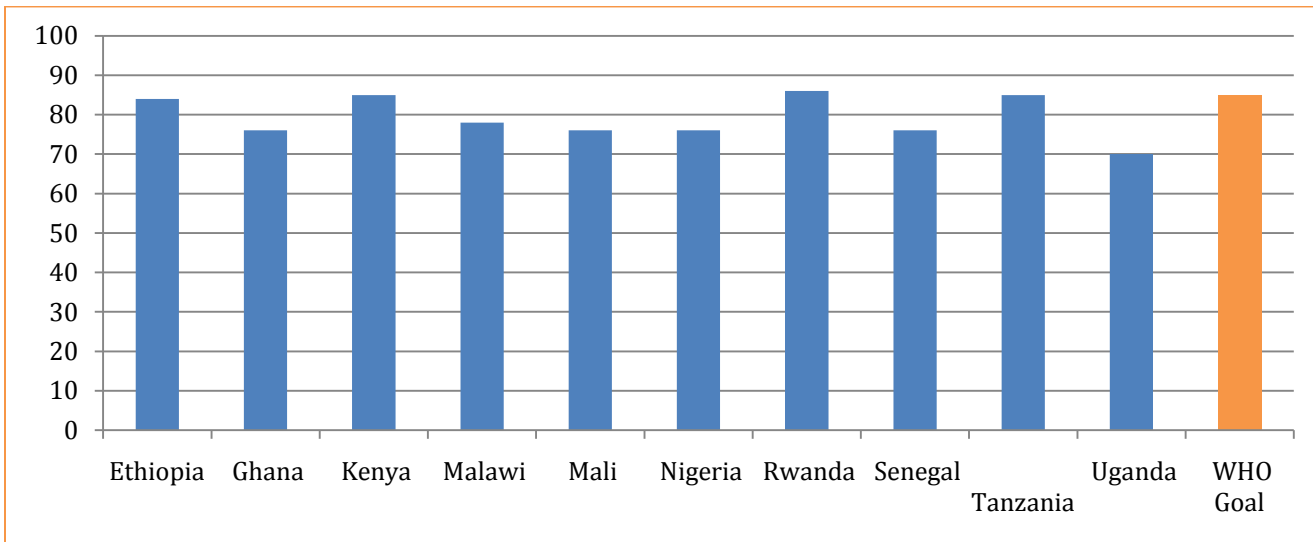
**Treatment of TB in the 10 countries of the MVP (indicator 6.9)**

Treatment success rates are good indicators of the performance of a National TB Program and are often considered a proxy for estimating drug resistance in the country. **The WHO target for TB control and elimination is for countries to successfully treat 85% of TB cases detected.** In 2008, 3 countries reached the WHO target (Kenya, Rwanda and Tanzania) while Ethiopia was close. Uganda demonstrated the lowest treatment outcome with only 70% of patients successfully treated.

For MVP sites, a successful TB initiative will reach two sequential targets:

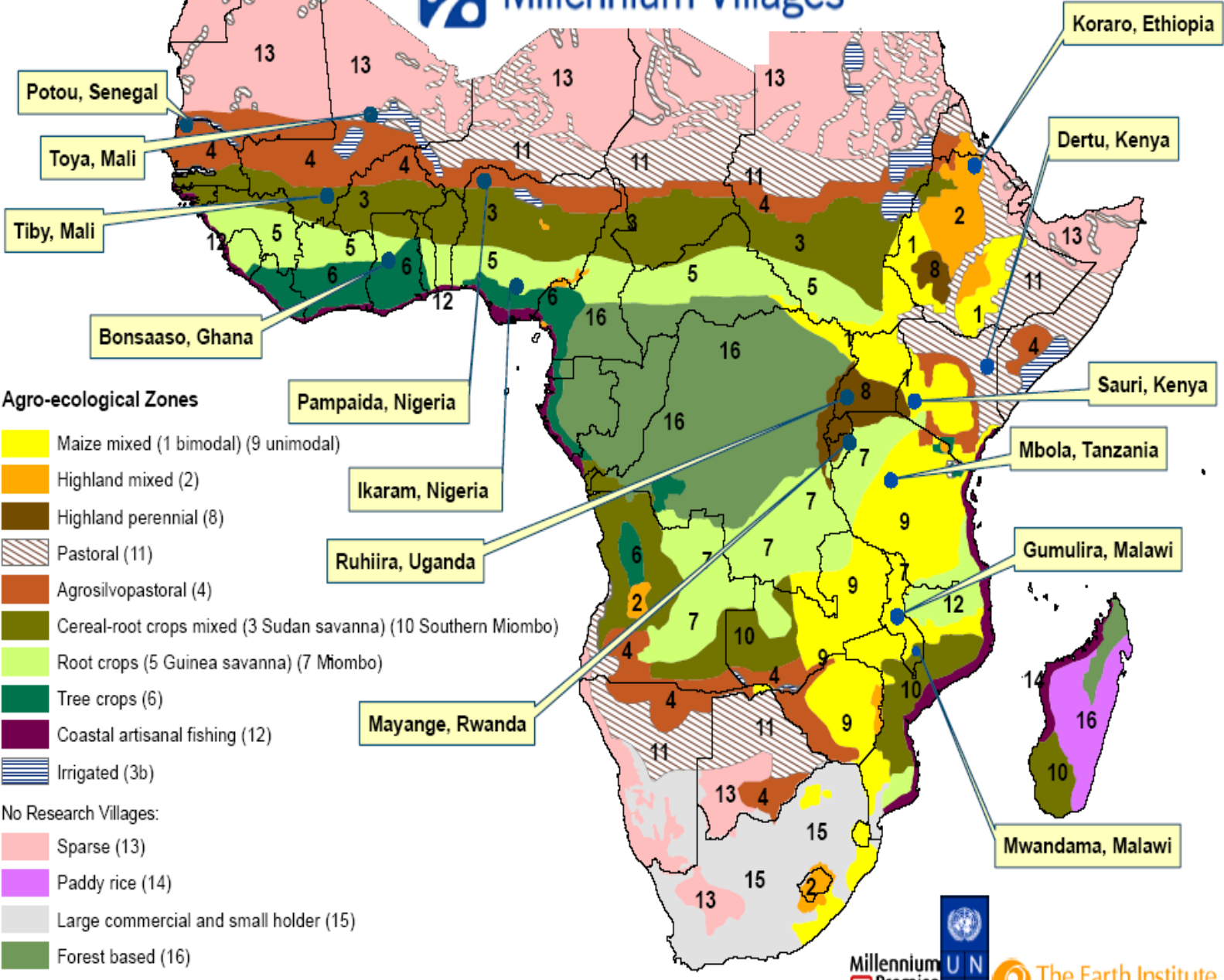
1. Reach a treatment success rate that is higher than the national average
2. Reach the WHO target of successfully treating 85% of cases diagnosed

National Treatment Success Rates for MVP Countries, 2008



$$\text{Treatment Success Rate} = \frac{\text{Number of cases completed + cured}}{\text{Total cases treated at the site}} \times 100$$

# Map of Millennium Villages Sites



Adapted from Dixon et al. 2001. Farming Systems and Poverty. FAO



**Sputum Transport System (Case Study – BONSAASO / GHANA)**

The aim of the TB Initiative is to provide a patient-centered approach, from the diagnosis to the completion of treatment. Often times, the first point of care for patients are health posts that cannot provide TB diagnostic services. When TB is suspected, patients are therefore referred by the nurses to the closest district hospital where TB microscopy services are available. “Closest” however is a relative term and most likely means either an expensive transport by bus, or walking for several hours.



In Bonsaaso, the Millennium Village setting in Ghana, TB suspects were systematically referred to Agroyesum’s district hospital (located 20 km north) before the project implemented the TB Initiative. Since there are no transport systems available between the two villages, patients were forced to either find personal transport by securing the night before the intended journey to the district hospital a space in a car driving out to Agroyesum, or delay their diagnosis. Considering the very low case detection rate in the district before the inception of the project, it can be assumed that most patients failed to report to the district hospital for diagnosis after being screened and suspected of TB.

## SPECIFIC INTERVENTIONS

Community Health Workers (CHW) were trained by the TB Initiative for collection of the 3 required sputum samples of suspected TB cases directly at the household level.

Sputum containers are typically sealed plastic cups that do not present a risk of breakage, and so are safe to handle. All containers relative to one patient are wrapped in a plastic bag, alongside a sheet of paper filled by the CHW to identify the patient by name, sex, age and address. A mobile phone number (of the reporting CHW) is also made available for transmission of diagnostic result.



Twice a week (either Tuesday/Thursday or Wednesday/Friday depending on the site), all collected sputum samples are picked up at all the local clinics and transported by motorcycle, in a Styrofoam box, to the nearest diagnostic facility for smear microscopy analysis of the samples

Results are typically available within 24 hours. All results (positive and negative) are sent to the CHW via an SMS text message (and directly to the patient if a mobile phone number is available) to initiate treatment. Once notified of the positive result, the CHW can report to the Health Center and pick up the first doses of TB treatment to dispense to the patient. All confirmed TB patients are placed on treatment immediately, and supervised by the reporting CHW.



Supervision will occur daily for the first 2 months (intensive phase) and once weekly during the remaining of treatment (continuation phase).

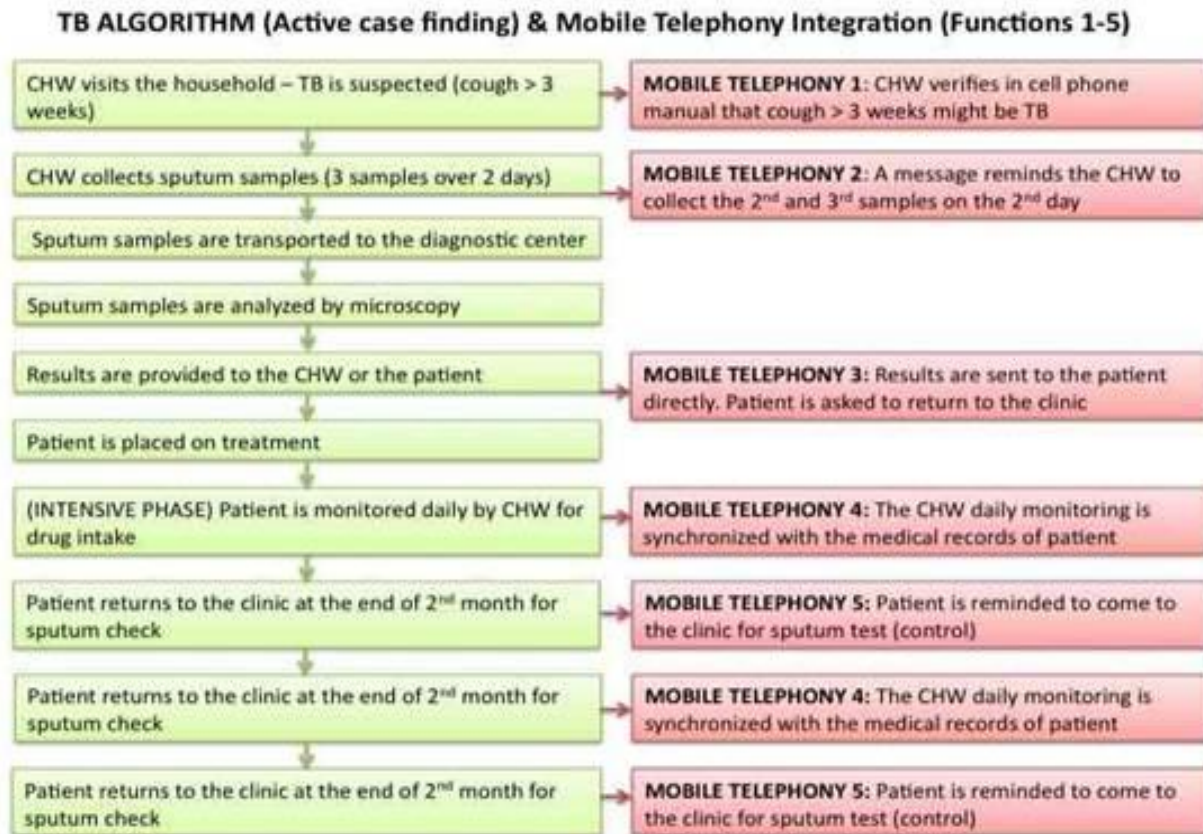
*(Photos Courtesy of Eric Akosah)*

**RapidSMS**

Starting mid 2010, the TB Initiative will use RapidSMS in several sites to develop a robust TB detection, monitoring, and treatment management system . RapidSMS is a open source SMS-based platform that enables mass-scale mobile data collection, workflow management and messaging. Using any mobile phone, Community health care workers can quickly report in data and interact with the TB system using simple formatted SMS messages. These messages will feed into a powerful rule-based engine that will be able to monitor and track treatment status of patients providing automated alerts both to the patient and community health care worker tasked with their treatment.

RapidSMS will not only facilitate the delivery of TB test results to patients but will help the health team monitor the status of treatment in the homes allowing the health team to closely monitor adherence. The data collected via RapidSMS, will be displayed in a powerful web based dashboard that could be used by the health team for real time monitoring of TB incidence, prevalence and treatment in the Millennium Villages. RapidSMS will also be able both to export reports that can be fed into National Healthcare Informations Systems (NHIS) that are used to inform local and national policy makers along with international groups like the WHO.

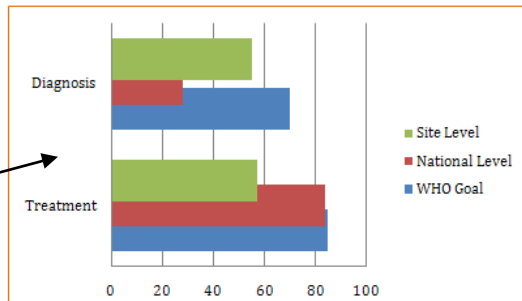
The following diagram provides an example of how an SMS based TB monitoring and treatment management system could be used to support active case-finding of TB by community health workers in our sites.



Site Name and country (alphabetically by country)

Koraro, ETHIOPIA

**TB Outcomes for Koraro, Ethiopia 2008**



The eleven Millennium Villages in this cluster have a population of 55,000. The cluster is located in one of the poorest regions in all of Ethiopia- it is remote, isolated and suffers from severe drought and poor infrastructure. The MVP has upgraded the village clinic by hiring staff, improving equipment, providing essential medicines and undertaking minor renovations. Community health workers provide additional assistance.

General description of each cluster and specific MVP interventions (Courtesy of Millenium Promise)

Graph depicting how the site compares to the national level and WHO goal of case detection rate (diagnosis) and treatment success (treatment)

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
Indicator 6.10 (Diagnosis)	✓	X
Indicator 6.10 (Treatment)	X	X

**Diagnosis:** The Case Detection Rate (CDR) for Koraro in 2008 was 55%, which was well above the national average of 28% but below the WHO Goal / MDG Target of 70%. While Koraro has access to many laboratories in the cluster to test sputum samples by microscopy, only the laboratory located at the Hawzien District Hospital provided satisfactory results, questioning the validity of results provided by laboratories in clinics. A breakdown of diagnosis by quart also demonstrated a very irregular diagnosis stream, with a very high number of patients screened in the first quart, and a subsequent steady and abrupt decrease in the following quarts.

**Treatment:** The treatment success rate for the site was 57%, which was above the national average of 84% and the WHO Goal / MDG Target of 85%. While this number is extremely high, both failure rates and death rates are high, which is surprising in a setting considered as low HIV. Drug resistance cannot be excluded, even though the national prevalence is low.

Indicates whether the site has achieved each target of surpassing the national level (target 1) and WHO Goal/MDG Target (Target 2) regarding the Diagnostic and Treatment Indicator

Written description of the site's progress regarding diagnosis and treatment outcomes

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
Indicator 6.9 (Death Rate)	✓	X

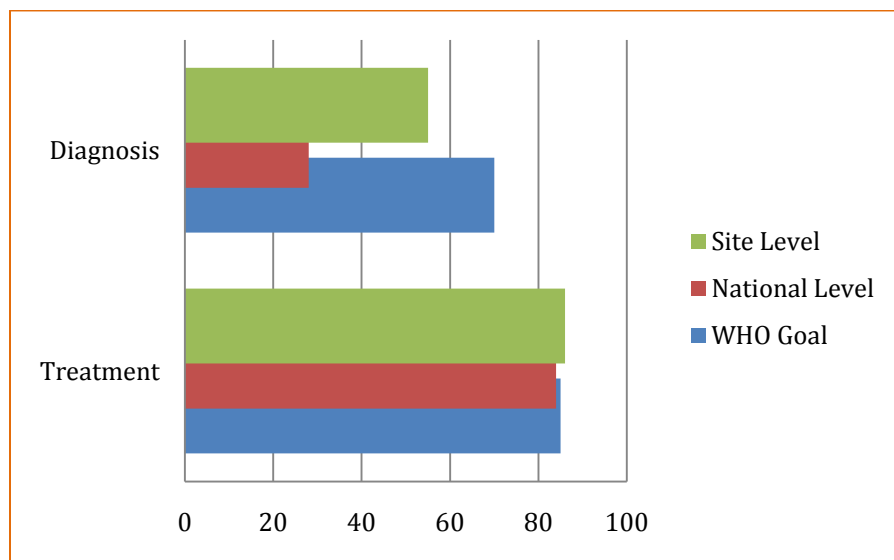
(Dr. Aregawi Tedella)

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Site Coordinators name

Indicates whether the site has achieved one or both of the targets regarding indicator 6.9. The first is surpassing the national case fatality level and second is reporting 0 deaths for the year.

## TB Outcomes for Koraro, Ethiopia 2008



*The eleven Millennium Villages in this cluster have a population of 55,000. The cluster is located in one of the poorest regions in all of Ethiopia- it is remote, isolated and suffers from severe drought and poor infrastructure. The MVP has upgraded the village clinic by hiring staff, improving equipment, providing essential medicines and undertaking minor renovations. Community health workers provide additional assistance.*

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
Indicator 6.10 (Diagnosis)	✓	X
Indicator 6.10 (Treatment)	✓	✓

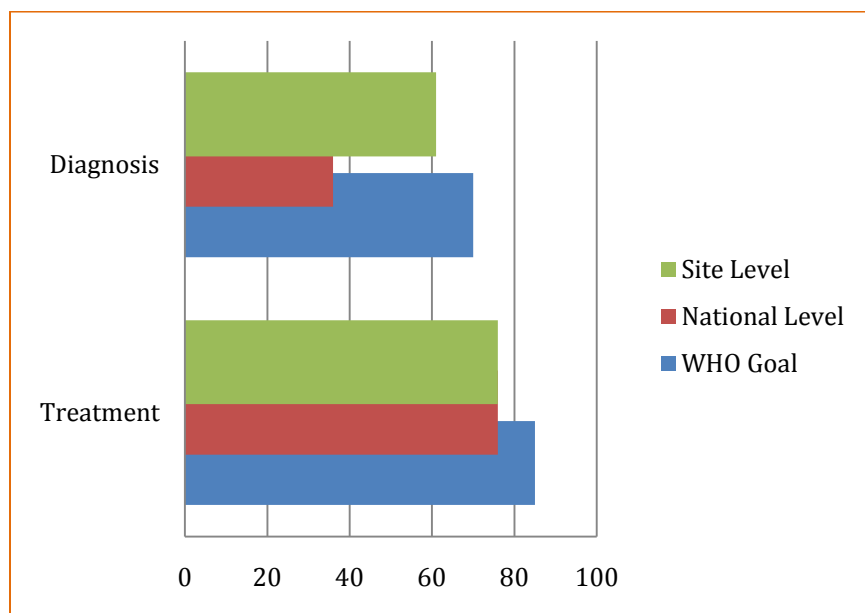
**Diagnosis:** The case detection rate for Koraro in 2008 was 55%, which was well above the national average of 28% but below the WHO Goal / MDG Target of 70%. While Koraro has access to many laboratories in the cluster to test sputum samples by microscopy, only the laboratory located at the Hawzien District Hospital provided satisfactory results, questioning the validity of the results provided by laboratories in the site clinics. A breakdown of diagnosis by quarter also demonstrated a very irregular diagnosis stream, with a very high number of patients screened in the first quarter, and a subsequent steady and abrupt decrease in the following quarters.

**Treatment:** The treatment success rate for the site was 86%, which was above the national average of 84% and the WHO Goal / MDG Target of 85%. Koraro benefits from the extensive network of CHEWs (two female health extension workers for every village) deployed throughout Ethiopia, and who are highly skilled health workers. DOTS monitoring is under their supervision and they ensure good compliance and the monitoring of possible side effects.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
Indicator 6.9 (Death Rate)	✓	X

(Dr. Aregawi Tedella)

## TB Outcomes for Bonsaaso, Ghana 2008



The six Millennium Villages in this cluster have a population of about 31,800 individuals that are spread out and separated from one another by thick rainforest and diverse vegetation. There are very few functional health facilities in the entire cluster and community members have to travel between 2 and 40km to access health care. They are currently being served by 6 clinics (another is planned for construction in 2010).

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
<b>Indicator 6.10 (Diagnosis)</b>	✓	X
<b>Indicator 6.10 (Treatment)</b>	✓	X

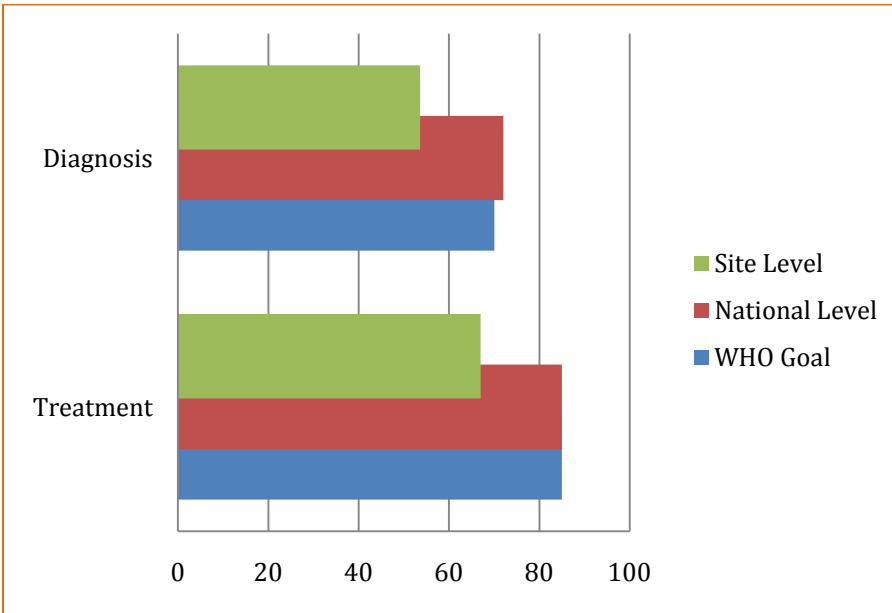
**Diagnosis:** The case detection rate for Bonsaaso in 2008 was 61%, which was above the national average of 36% but still below the WHO Goal / MDG Target of 70%. Although Bonsaaso does not have its own laboratory for microscopy, it benefits from an excellent screening and sputum transport system within the cluster and a good TB laboratory at the District Hospital in Agroyesum. It is notable that Bonsaaso progressed from detecting less than 20% of expected cases in 2007 to over 60% in just one year.

**Treatment:** The treatment success rate for the site in 2008 was 76%, which was equal to the national average, but below the WHO goal / MDG Target of 85%. Only one patient defaulted, which implies that the site is adequately ensuring that its patients complete treatment and do not contribute to rising rates of resistance to anti-tuberculosis medications. Unfortunately, despite the great effort of the site to maintain patients on treatment until completion, the death rate was high at about 17%. This is surprising in a setting where HIV prevalence and TB drug resistance are considered low.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
<b>Indicator 6.9 (Death Rate)</b>	X	X

(Eric Akosah)

## TB outcomes for Sauri, Kenya 2008



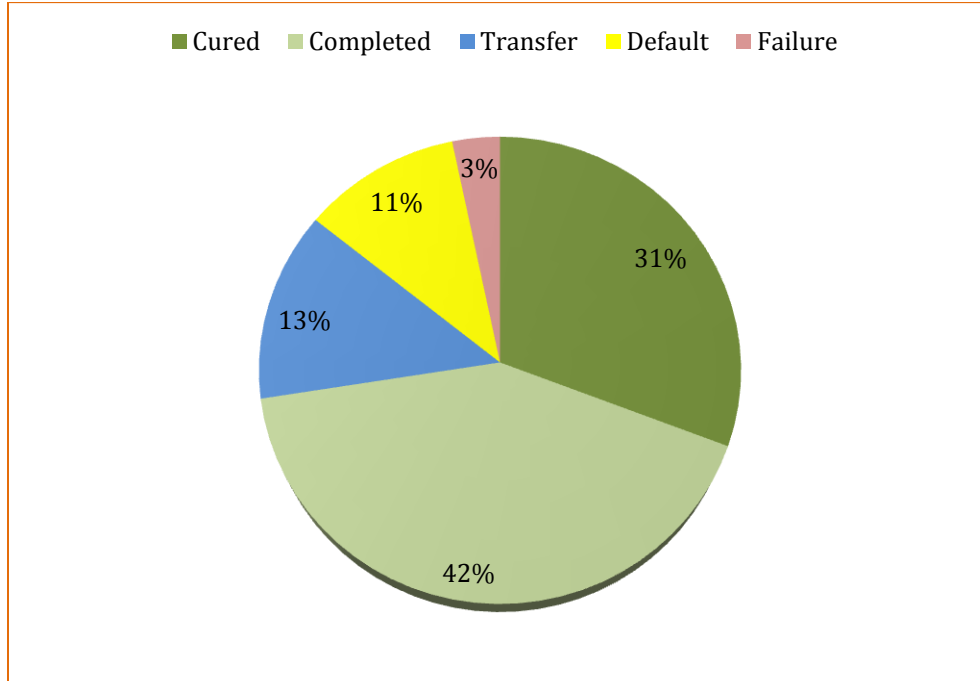
*The eleven Millennium Villages in this cluster have a population of about 55,000 individuals in Western Kenya. Between 60-70% live on under 1\$ a day. There was no doctor at the district Hospital until MVP brought one in to split his time between the Sauri clinic and the Hospital. Over half of this cluster (52%) is infected with Malaria, and about a quarter are HIV positive (24%). There are now six health centers available to this cluster.*

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
<b>Indicator 6.10 (Diagnosis)</b>	<b>X</b>	<b>X</b>
<b>Indicator 6.10 (Treatment)</b>	<b>X</b>	<b>X</b>

**Diagnosis:** The case detection rate for Sauri was 54% in 2008, which was below the national average of 72%, and below the WHO Goal and MDG Target of 70%. Sauri's overall performance for 2008 was significantly hindered this year due to **post-election violence in January-February 2008**. While the case detection rate improved in the last three quarters, for the first it was only 6%. It is also important to note that Kenya has a high proportion of smear negative TB cases, rendering case detection more challenging.

**Treatment:** The treatment success rate for the site was low at 67%, below the national average and the WHO goal / MDG Target of 85%. There were no TB deaths reported in this cluster in 2008. However 20 individuals defaulted. Post-election violence throughout Kenya (particularly in Kisumu, near the Sauri Millennium Village) affected the cluster's performance. A breakdown of treatment outcomes for 2008 shows an interesting trend:

**Treatment Outcomes Sauri, Kenya 2008**

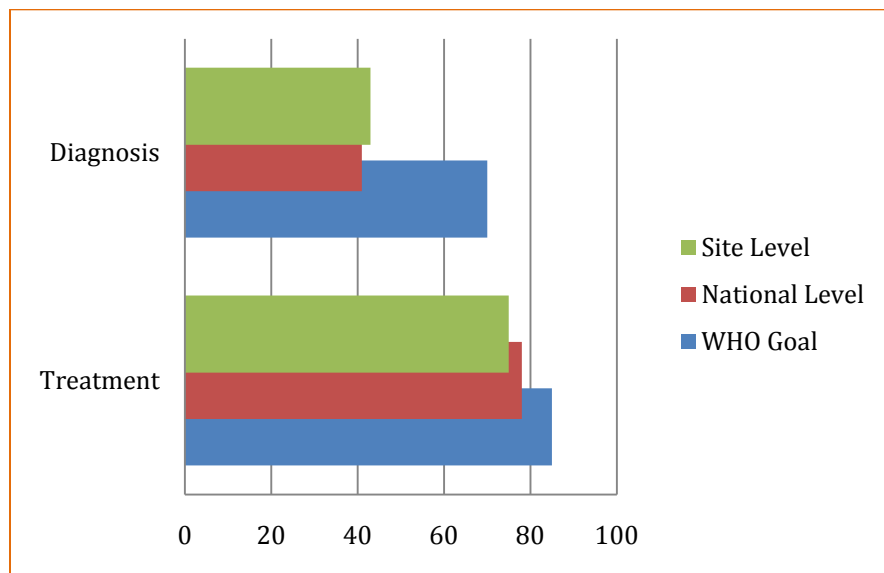


Over half of patients who completed treatment did not report back to the clinic for their final sputum examination and over 1 in 10 patients defaulted. Sauri is one of the largest clusters in the Millennium Villages Project, and the intervention, while technically limited to a cluster of 65,000 people, effectively spans to cover a population closer to 150,000 patients. Therefore, many patients who initiate treatment within the Sauri cluster may effectively be from outside the cluster, explaining both the high rates of defaulters and patients not reporting for their final sputum examination. A breakdown of treatment performance by quarter shows the significant drop caused by the post election violence, effectively decreasing overall performance for 2008. Additionally, 15 patients were not evaluated and were excluded from this report. Treatment success rates for the last two quarters of 2008 suggest much better results can be expected in 2009.

	<b>TARGET 1 (National Level)</b>	<b>TARGET 2 (No Deaths)</b>
<b>Indicator 6.9 (Death Rate)</b>	<b>X</b>	<b>X</b>

(James Wariero)

## TB Outcomes for Mwandama, Malawi 2008



*The seven Millennium Villages in this cluster have a population of about 35,000 individuals. The region is characterized by native vegetation of the Miombo woodlands. This cluster is in the world's only region that has experienced a rise in temperature and drop in rainfall in recent years. Nearly 90% of the cluster lives in extreme poverty, and Malawi's under-five mortality rate is one of the highest in the world.*

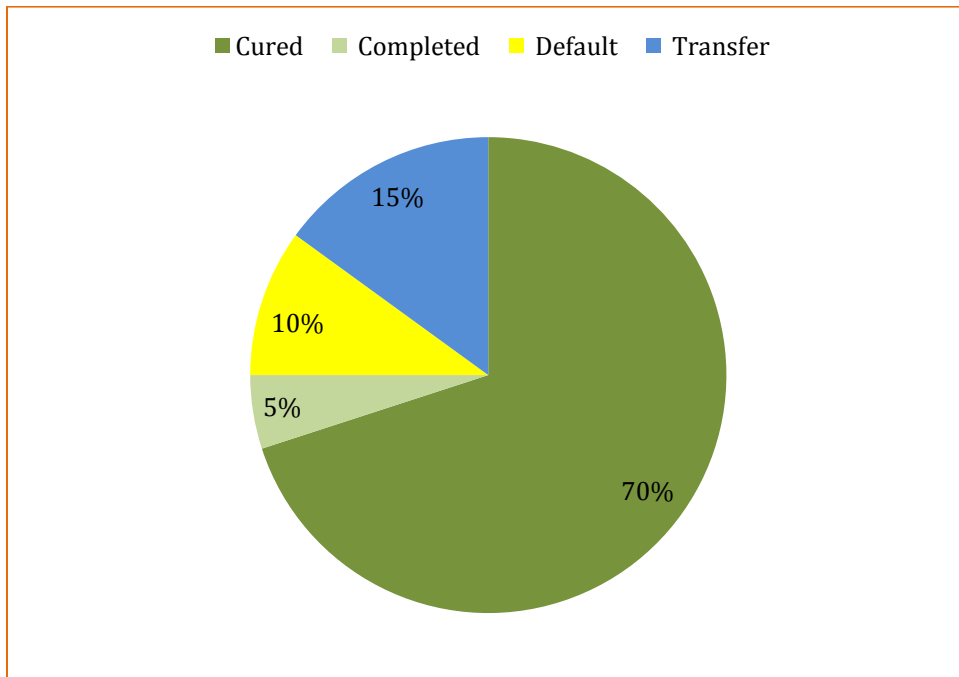
	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
<b>Indicator 6.10 (Diagnosis)</b>	✓	X
<b>Indicator 6.10 (Treatment)</b>	X	X

**Diagnosis:** The case detection rate for Mwandama in 2008 was 43%, which was above the national average of 41% but still below the WHO Goal / MDG Target of 70%. This could be explained by the absence of an on-site laboratory in the Mwandama cluster in 2008 (samples were analyzed at the Zomba District Hospital) and a tedious national system for sputum collection, transport and screening. Samples are collected and transported to Zomba district hospital, with a turnaround time for microscopy results of a week or more. Since 2009, Mwandama has had access to Thondwe, located closer to the cluster, therefore potentially increasing the case detection rate. It is also important to note that this cluster has a high number of smear negative cases, which are detected using X-Ray machines. Interestingly, when smear negative cases are included for calculation of the CDR, the case detection rate increased sharply to 80% of all expected cases.

**Treatment:** The treatment success rate for the site is 75% which is both below the national average of 78% and the WHO goal / MDG Target of 85%.

A breakdown of the treatment outcomes for smear positive cases is shown below:

**Treatment Outcomes Mwandama, Malawi 2008**

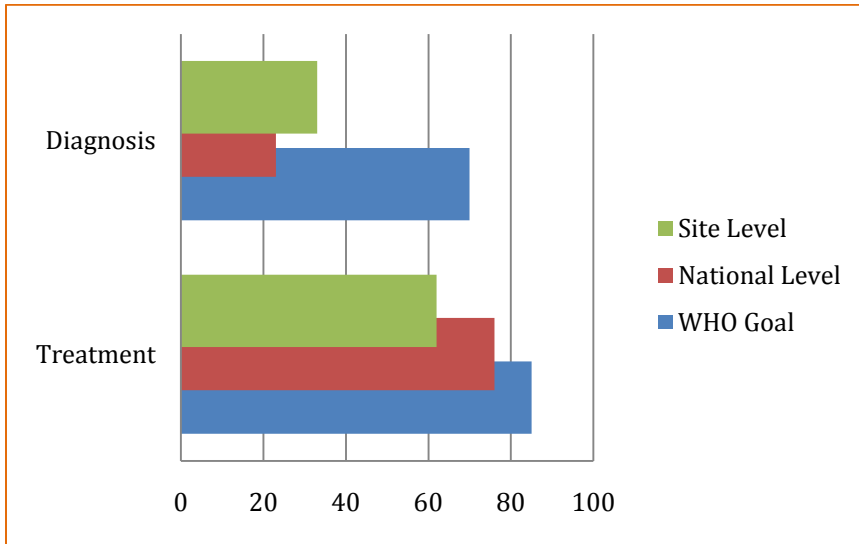


This site had a 75% treatment success rate, with the majority of patients being cured and/or completing their therapy. 3 patients (15%) were transferred to a different site for treatment, and only 10% (2) patients defaulted. 60% of the TB patients that were screened for HIV were found to be co-infected, a high rate which matches the national average. HIV/TB co-infection increases the likelihood of being smear negative. This cluster reported a high number of smear negative cases, and 19% (15) of smear negative patients died, which is greater than the national average death rate of 12%. It is important to note that many of this clusters TB cases are smear negative and must be detected using X-Ray and other tests, and that a high number are HIV positive. No smear positive patients died at this cluster for 2008.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
<b>Indicator 6.9 (Death Rate)</b>	✓	✓

(Chimwemwe Mateula, Dr. Thandiwe Mijoya)

## TB Outcomes for Tiby, Mali 2008



The eleven Millennium Villages in this cluster have a population of about 64,280 individuals in one of the poorest regions of Mali. Malaria prevalence is about 68%, and the cluster suffers from high child mortality rates due to economic and social factors. MVP has completed construction of two clinics, (bringing the cluster's total to six), and has trained 200 community health workers that now service Tiby households.

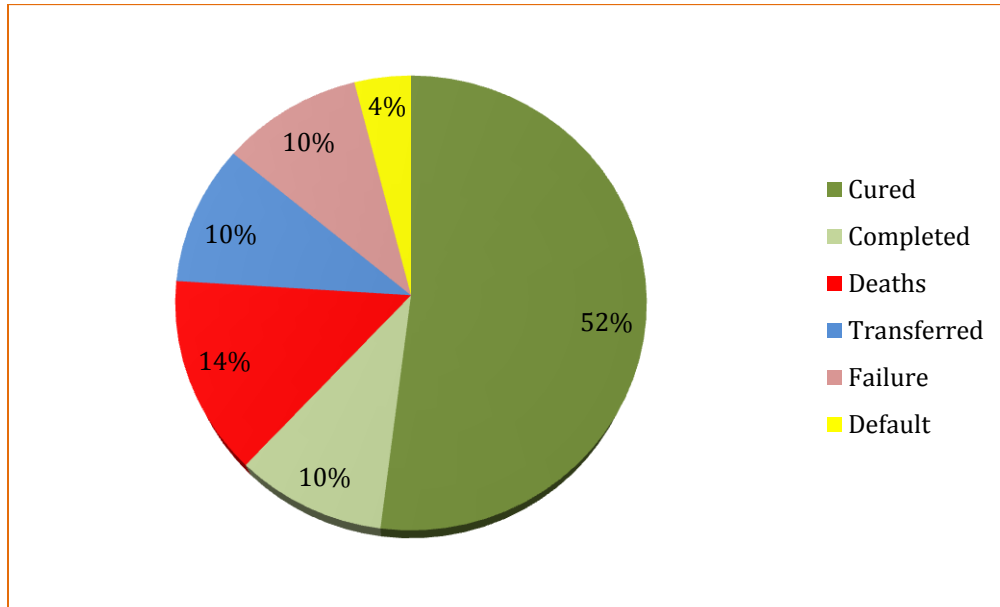
	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
<b>Indicator 6.10 (Diagnosis)</b>	✓	X
<b>Indicator 6.10 (Treatment)</b>	X	X

**Diagnosis:** The case detection rate for Tiby in 2008 remains low at 33%, which is above the national average of 23%, but below the WHO Goal / MDG Target of 70%. 62% of the patients detected in this cluster were male, while the average age was 42. There are 5 clinics in the Tiby cluster currently referring patients for diagnosis and following the diagnosed patients throughout treatment: Dioro, Soké, Babougou, Koila and Tiby. However, only Dioro is equipped with a laboratory performing TB microscopy, which possibly explains why about half of the patients diagnosed (52%) reported to Dioro.

**Treatment:** The treatment success rate for cases diagnosed in the Tiby cluster in 2008 was 62%, which is below both the national average of 76% and the WHO goal / MDG Target of 85%, and unfortunately also one of the lowest across the Millennium Villages Project.

The breakdown of treatment outcomes shows a worrisome trend:

**Treatment Outcomes Tiby, Mali 2008**



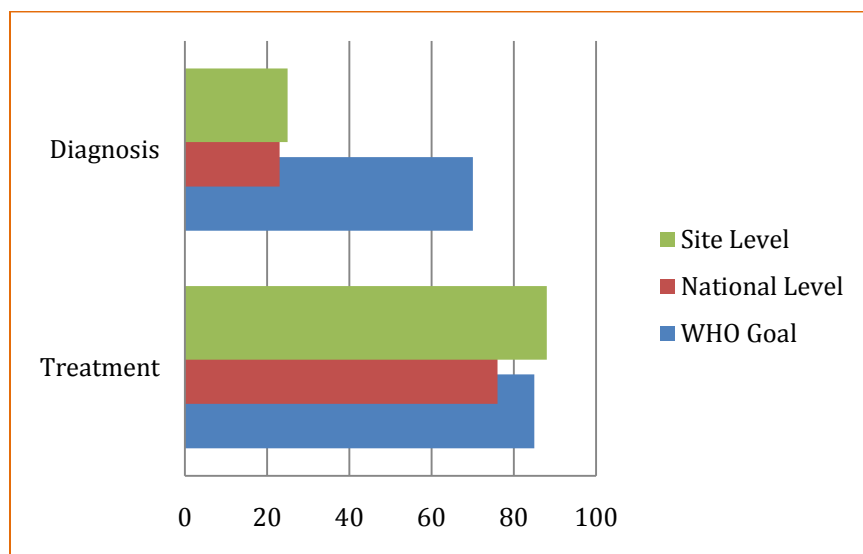
The site reported a high death rate of 14%, slightly higher than the national average (11%). This is surprising in a cluster where the majority of patients are HIV negative (with 90% of TB patients confirmed HIV negative). The site also reported a higher than average failure rate of 10% (compared to the 4% reported nationally in the latest WHO report). In settings implementing DOTS, the recommended WHO treatment strategy, treatment failure occurs when patients do not respond to TB therapy. Taken together, this suggests a possible drug-resistance problem in the cluster, and possibly, in the country. Unfortunately, Mali has not yet undergone a national survey to assess drug-resistance rates. Preliminary results from a survey carried out by the Earth Institute, in partnership with Becton Dickinson and the Applied Molecular Biology Laboratory at the University of Bamako, show that close to 14% of samples screened (collected from the 6 communes of Bamako) are drug resistant, and 7% are multidrug-resistant. This could explain both the high failure rates (patients are not responding to treatment because they are resistant) and death rates. Another explanation for the high death rate could be cultural. In Mali, patients nearing death usually travel back to their area of origin to die alongside their family members. A dying TB patient placed on treatment in Bamako, but who is transferred to Tiby and dies there is registered as a TB death in Tiby.

The TB initiative plans to survey sputum samples from the TB cluster to determine the drug-resistance.

	<b>TARGET 1 (National Level)</b>	<b>TARGET 2 (No Deaths)</b>
<b>Indicator 6.9 (Death Rate)</b>	<b>X</b>	<b>X</b>

(Dr. Tinzana Coulibaly)

## TB Outcomes for Toya, Mali 2008



The Millennium Villages in this cluster have a population of 5,000 individuals that follow both sedentary and nomadic lifestyles. The area is characterized by very low and highly unpredictable rainfall patterns, coupled with drought periods and high temperatures. MVP interventions began in January 2008. There are four Community Health Centers in the district that lack infrastructure, transportation, and skilled health personnel making access and quality of care difficult to achieve.

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
Indicator 6.10 (Diagnosis)	✓	X
Indicator 6.10 (Treatment)	✓	✓

**Diagnosis:** The case detection rate in Toya was 25% in 2008, which was slightly higher than the national level of 23%, but below the WHO/MDG target of 70%. In Toya, Community Health Workers refer suspected TB cases (based on symptoms) to health posts or health centers, where they are further screened by nurses. If TB is suspected, the patient (not the sputum) is sent to the laboratory, located in Timbuktu at the reference health center. There was a plan to implement TB microscopy in the cluster by upgrading the CSCOM (Centre de Santé Communautaire) of Issafaye to include a lab, but it has not been approved in the budget. However, in 2010, the CSCOM in the Toya cluster have been equipped with microscopes and technicians are going to be trained.

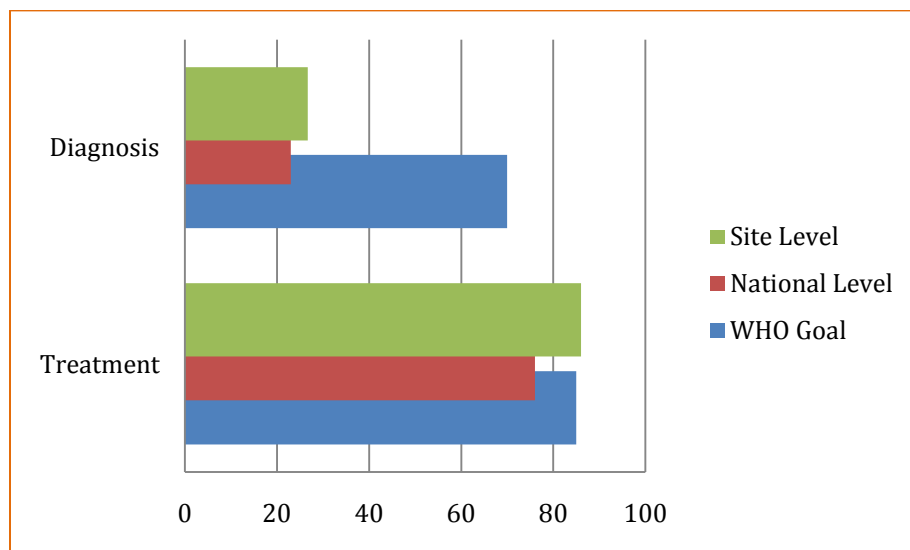
**Treatment:** The treatment success rate in Toya was 88%, which was above the national level of 76% and allowed Toya to successfully reach the WHO/MDG Target of 85% in 2008. In Toya, TB treatment is delivered by Community Health Workers who are following up on confirmed TB patients. While patients access their drugs at the clinic, the follow-up through CHWs (compliance, monitoring of side effects...) occurs at the household level.

There were no deaths reported for this site in 2008.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
Indicator 6.9 (Death Rate)	✓	✓

(Dr. Bakary Diabate)

## **TB Outcomes for Ikaram, Nigeria 2008**



*The four Millennium Villages in this cluster have a population of about 20,000 individuals that depend on sub-subsistence farming. The soils are severely depleted in nitrogen, putting a strain on the population and causing high rates of malnutrition. MVP has refurbished two of four existing health centers, and facilitated the posting of a complete and fully trained health team.*

	<b>TARGET 1 (National Level)</b>	<b>TARGET 2 (WHO Goal/MDG Target)</b>
<b>Indicator 6.10 (Diagnosis)</b>	✓	X
<b>Indicator 6.10 (Treatment)</b>	✓	✓

**Diagnosis:** The case detection rate for Ikaram in 2008 was 27%, which is above the national average of 23% but below the WHO Goal / MDG Target of 70%. One possible explanation for this result was the many shortages and stock outs of diagnosis reagents (for microscopy staining) that plagued the country in 2008, and unfortunately, also affected the Ikaram site. HIV screening also fell short in 2008: only 2 patients were tested, and both were found positive, stressing the necessity to increase HIV testing access.

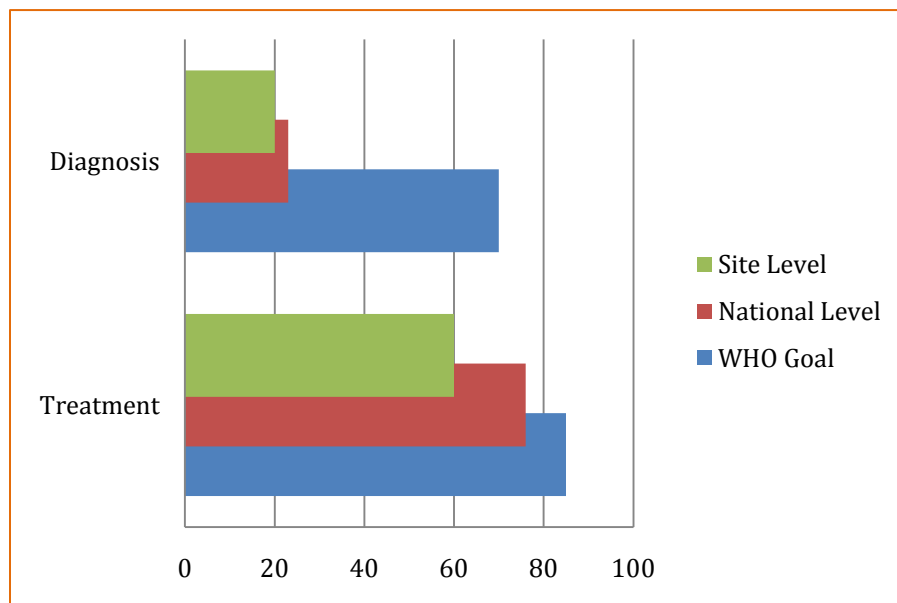
**Treatment:** The treatment success rate for the site was very high at 86%, which is both above the national average of 76% and the WHO goal / MDG Target of 85%. Only one patient defaulted, which demonstrates that the health services adequately maintained TB patients detected on treatment until completion.

There were no deaths reported at this site for 2008.

	<b>TARGET 1 (National Level)</b>	<b>TARGET 2 (No Deaths)</b>
<b>Indicator 6.9 (Death Rate)</b>	✓	✓

(Dr. Gbenga Osunmakinwa)

## TB Outcomes for Pampaida, Nigeria 2008



*The four Millennium Villages in this cluster have a population of about 15,000 individuals. The community is predominantly made up of Hausas and Fulanis, two ethnic groups that have co-existed peacefully for over a century. The cluster has one clinic located approximately 10 km from the village, accessible only by an uneven dirt road. Bicycles and motorbikes are the only means for transporting patients. The MVP represents the first time that statistics have been calculated for this area.*

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
<b>Indicator 6.10 (Diagnosis)</b>	X	X
<b>Indicator 6.10 (Treatment)</b>	X	X

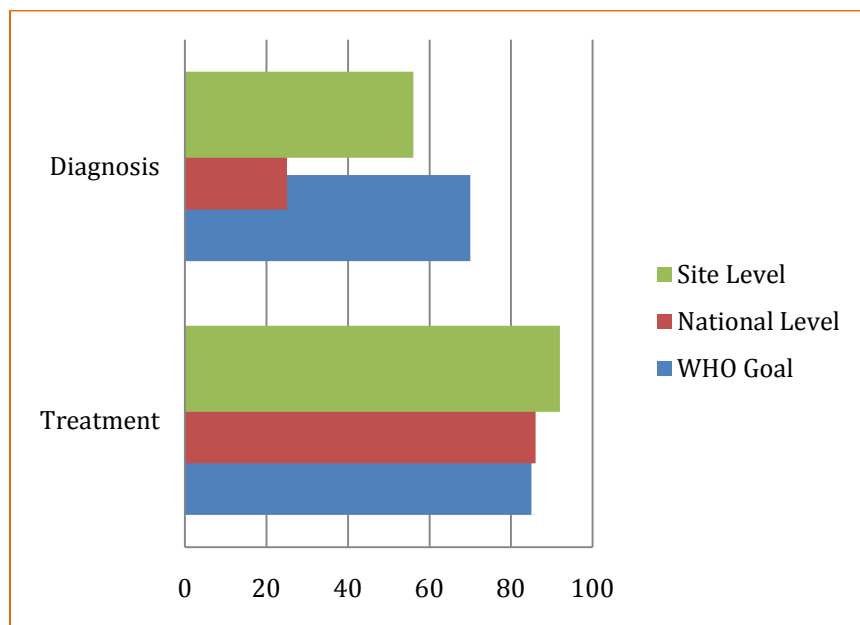
**Diagnosis:** The case detection rate was 20% in 2008, but since then, the infrastructure has significantly improved. Preliminary results from 2009 strongly suggest an increase in cases detected as the laboratory in the cluster became operational, although equipment and reagents for TB diagnosis were not available before October. In the first quarter of 2009, a mass voluntary screening for HIV and TB was carried out in collaboration with the State's TB and Leprosy Control Programme. Patients suspected on the basis of symptoms suggestive of TB were subsequently referred to Ikara General Hospital. The low CDR in 2008 may also be explained regionally by many stock outs of diagnosis reagents (fro microscopy staining) that plagued the country that year.

**Treatment:** The treatment success rate for the cluster is 60% in 2008. One patient was found to be co-infected with HIV. Three patients completed treatment, one defaulted and one died, for a total of five cases detected.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
<b>Indicator 6.9 (Death Rate)</b>	X	X

(Clement Woje)

## TB Outcomes for Mayange, Rwanda 2008



*The four Millennium Villages in this cluster have a population of 24,000 individuals in an area that is flatter and drier than most of the country.*

*The area suffers from sporadic rainfall and declining soil fertility, leading to endemic poverty, illness and lack of economic opportunity. MVP has upgraded the health clinic, adding new rooms, training staff and providing staff, equipment and medicines, with plans for a new maternity ward and lab.*

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
<b>Indicator 6.10 (Diagnosis)</b>	✓	X
<b>Indicator 6.10 (Treatment)</b>	✓	✓

**Diagnosis:** The case detection rate for Mayange in 2008 was 56%, which was significantly higher than the national average of 25% but still below the WHO Goal / MDG Target of 70%. Results for this site have been somewhat irregular throughout the year 2008, and Mayange will need to systematize the diagnostic effort in order to keep the CDR high each quarter and reach the WHO/MDG Goal in the future. Mayange's efforts can be lauded as the TB laboratory was only opened in 2007.

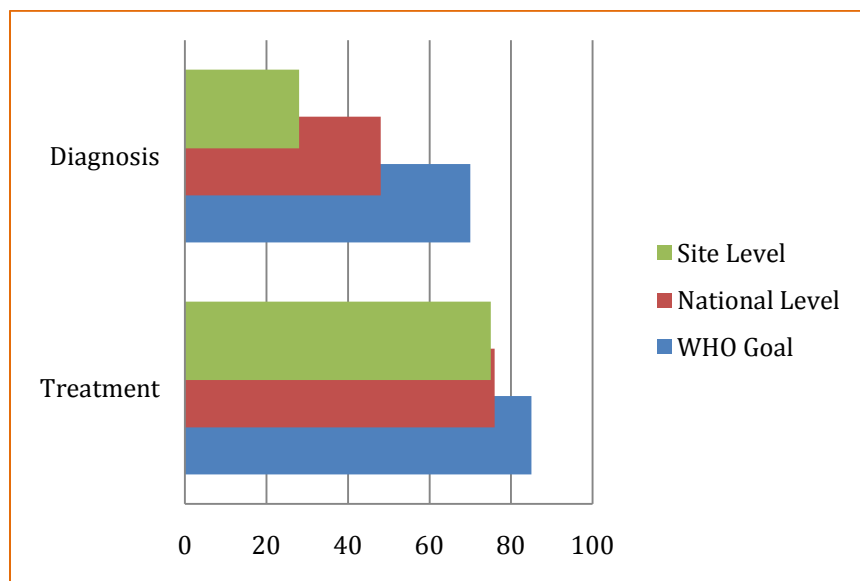
**Treatment:** The treatment success rate for the site was extremely high at 91%, which surpasses the national average of 86% and the WHO Goal and MDG Target of 85%. Close to 9% of patients were co-infected with HIV but the site has a good track record of management of co-infected patients.

There were no deaths reported for this site in 2008.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
<b>Indicator 6.9 (Death Rate)</b>	✓	✓

(Dr. Felician Rwagasore)

## TB Outcomes for Potou, Senegal 2008



*The seven Millennium Villages in this cluster have a population of 31,000 individuals. The cluster is located along the highly polluted coast, posing many public health problems. The nearest health center was in Leona, 7km away, but the MVP has finished construction of new clinics and is currently refurbishing the existing one. The clinics are staffed by trained nurses who are supported by about 90 community health workers.*

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
Indicator 6.10 (Diagnosis)	X	X
Indicator 6.10 (Treatment)	X	X

**Diagnosis:** The case detection rate for Potou was 28% in 2008, which was below the national average of 48%, and also below the WHO Goal / MDG Target of 70%. Potou did not benefit from a laboratory within the cluster in 2008. Patients were required to travel to Louga for diagnosis and initiation of TB treatment. The TB lab in Leona was opened in 2009, simplifying diagnostic procedure for patients in the cluster.

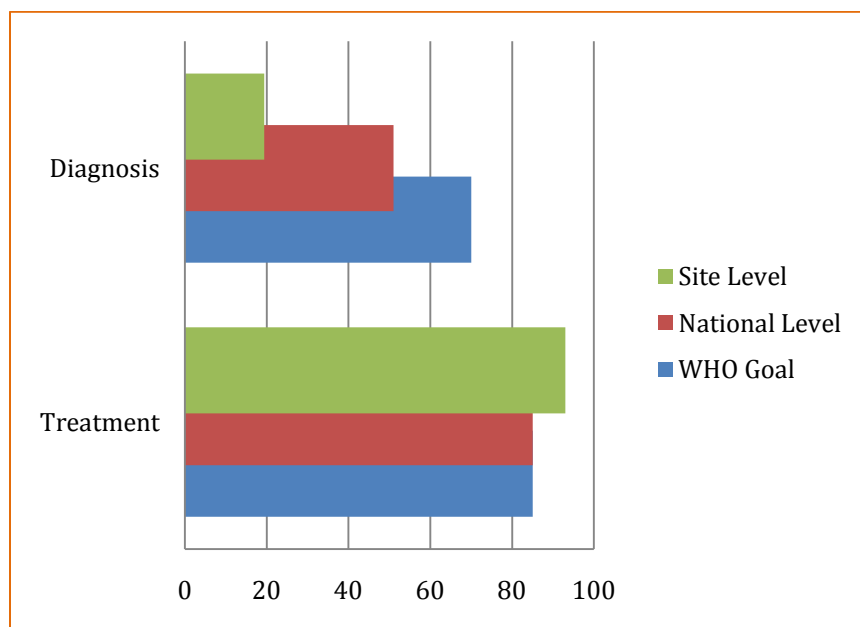
**Treatment:** The treatment success rate for the site was 75% which is below the national average of 76% in 2008, and below the WHO goal / MDG Target of 85%. Despite the low number of TB patients on treatment, therefore making monitoring more accessible and manageable for the health staff, one patient failed treatment. It will be necessary to adequately monitor patients' outcome in 2009 with an expected increase in cases detected due to the proximity of diagnostic services in the cluster.

There were no deaths for 2008 at this cluster.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
Indicator 6.9 (Death Rate)	✓	✓

(Dr. Bocar Daff, Dr. Massamba Sène)

## TB Outcomes for Mbola, Tanzania 2008



The six Millennium Villages in this cluster have a population of 30,000 individuals spread out over an expansive area. The nearest city is Tabora, located 36 km away. Water-borne illnesses and infectious diseases such as malaria, acute respiratory infections, schistosomiasis, worms, TB and HIV/AIDS are prevalent. There is one health facility in the region 7 km from Mbola, meaning that many individuals in the cluster die without ever seeing a doctor or entering a clinic.

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
Indicator 6.10 (Diagnosis)	X	X
Indicator 6.10 (Treatment)	✓	✓

**Diagnosis:** The case detection rate for Mbola is 19% for 2008. The Uyui district TB register was used to identify the number of TB cases arising from MVP dispensaries from 2008 – present. 15 cases were identified in 2008 (of which 4 were HIV+). It is clear that the officially recorded rates of TB are artificially low in this rural region and the MVP project here is focused on improving diagnosis and data collection regarding TB incidence and prevalence within the cluster.

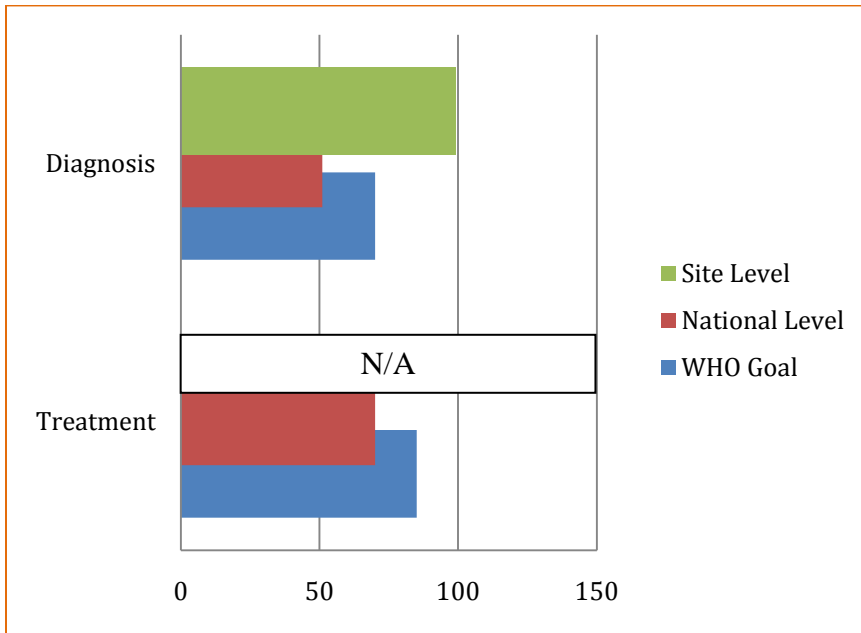
**Treatment:** The treatment success rate for the cluster is 93% in 2008. Patients with suspected TB are asked to attend Kitete Hospital, 40 km away from the cluster. All TB patients are offered HIV testing, and if found negative, the test is repeated at a 3 month interval. Contact tracing is done informally and prophylaxis offered where appropriate. Treatment of patients with TB seems to be well done, certainly in Kitete, although the villages have lower caseload than the country.

There were no deaths reported for this site in 2008.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
Indicator 6.9 (Death Rate)	✓	✓

(Dr. Deusdudit Mjungu)

## TB Outcomes for Ruhiira, Uganda 2008



*The 8 Millennium villages in the Ruhiira cluster have a population of about 50,000 individuals. The Ruhiira cluster is situated in the Isingiro District of Southwest Uganda. The area has two rainy seasons with June-August being the driest months. An estimated 40-50% of the population lives in extreme poverty. The area has the highest tuberculosis prevalence in southwestern Uganda. Lack of medical personnel, adequate supply of basic drugs and medical supplies lead villagers to seek care from unskilled health service providers.*

	TARGET 1 (National Level)	TARGET 2 (WHO Goal/MDG Target)
Indicator 6.10 (Diagnosis)	✓	✓
Indicator 6.10 (Treatment)	N/A	N/A

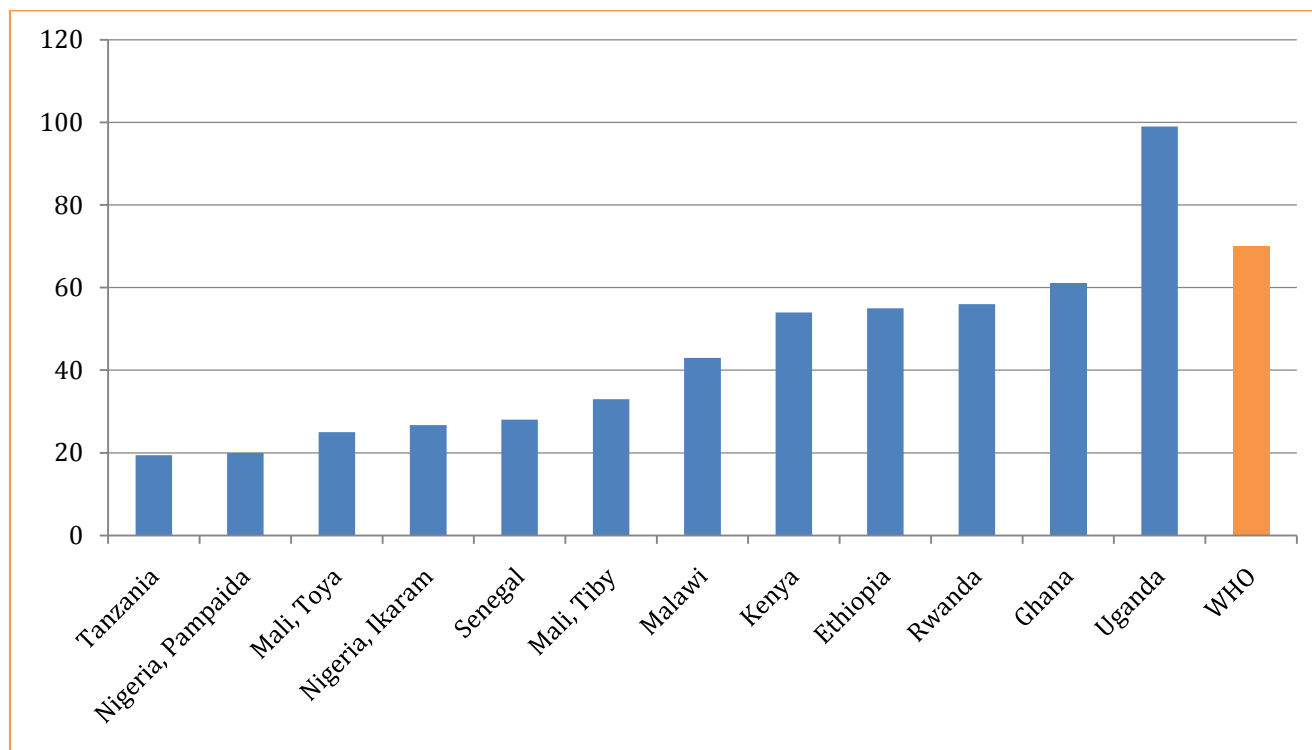
**Diagnosis:** The Case Detection Rate for Ruhiira was 99% of all expected sputum smear positive cases, which allowed Ruhiira to successfully reach the WHO / MDG Target within one year of implementation of the TB Initiative. Ruhiira is also the only site in 2008 to reach the MDG Target for diagnosis. Interestingly, a breakdown of cases detected in the cluster in 2008 shows a possibly worrisome trend: while 54 patients were diagnosed overall, 42 were male (78%) and 12 were female (22%). Since there is no biological gender bias in TB, a possible stigmatization (leading to women not seeking care if TB is suspected by the patient) should be investigated.

**Treatment:** Data regarding treatment outcomes for the Ruhiira site were unavailable at the time of publication.

	TARGET 1 (National Level)	TARGET 2 (No Deaths)
Indicator 6.9 (Death Rate)	N/A	N/A

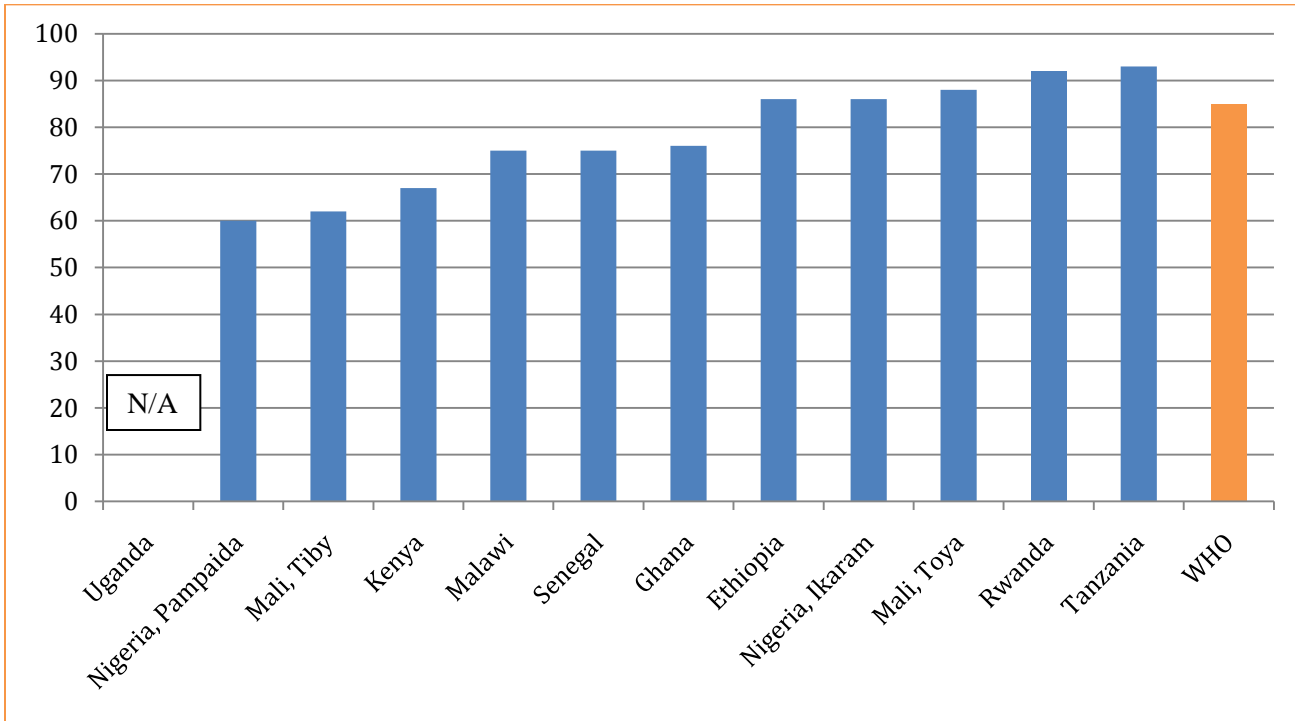
(Dr. Martins Okongo)

### Diagnosis: Case Detection Rates by Site, 2008



The graph shown above summarizes the case detection rates (CDR) of tuberculosis in each individual site within the Millennium Villages Project in 2008. It is notable that only the site in Uganda (Ruhira) successfully reached the MDG Target for diagnosis of TB, detecting 99% of all expected cases of smear positive TB. It is also interesting that there seems to be a clear distinction in CDR between sites having access to CHWs for active case finding of TB cases in the community (Ruhira, Bonsaaso, Koraro, Mwandama, Sauri, Mayange, Toya, Tiby) where CDR range between 43% and 99% and sites who do not have access to CHWs (Potou, Mbola, Ikaram, Pampaida) where CDR range between 19% and 27%. Other possible indicators to improved detection of cases are related to the presence of good laboratory services, either within the cluster (Sauri, Tiby, Ikaram, Ruhira and Mayange) or accessible through a system of sputum collection and transport (Bonsaaso). Therefore sites without reliable laboratory services should follow the example of Bonsaaso and set-up equivalent collection and transport systems. Finally, inevitable circumstances, such as post-election violence (as in the case of Sauri in 2008) can also lead to significant decrease in overall performance.

**Treatment: Treatment Success by site, 2008**



The graph shown above depicts the tuberculosis treatment success rates in each individual site (with the exception of Ruhiira, which did not report its treatment outcome at the time of publication) within the Millennium Villages Project in 2008. It is notable to highlight that within only one year of implementation of the TB Initiative, 5 sites successfully reached the WHO/ MDG Goal of 85% of patients successfully treated: Koraro, Ethiopia; Toya, Mali; Ikaram, Nigeria; Mayange, Rwanda and Mbola, Tanzania. Barriers to successful treatment of TB that were identified include shortage of TB drugs (in the national system), loss to follow-up, TB/ HIV and possibly (since adequate diagnosis is not currently available in most countries, this allegation cannot be verified) multidrug-resistant tuberculosis (MDR-TB). In at least three countries (Mali, Uganda and Rwanda), the TB Initiative is launching an investigation of the extent of the MDR-TB burden, which is likely causing higher treatment failure and death rates. Sites with high defaulter rates may require improved monitoring by either Health Personnel, or ideally, CHWs for individual assessment at the household level. Sites must ensure that patients co-infected with TB and HIV be treated adequately and concurrently, and that possible MDR-TB cases (linked to treatment failure) be reported to National TB Programmes.

**RESULTS OF THE TB INITIATIVE IN 8 CLUSTERS SURVEYED**

<b>LAB</b>	<b>CLUSTER</b>	<b>CDR</b>	<b>HIV Tests</b>	<b>TB/HIV Co-infection</b>	<b>Treatment Success</b>
<b>NO</b>	Koraro	55%	67%	6%	86%
<b>NO</b>	Bonsaaso	61%	71%	15%	76%
<b>YES</b>	Sauri	54%	N/A	10%	67%
<b>NO</b>	Mwandama	43%	N/A	60%	75%
<b>YES</b>	Tiby	33%	97%	7%	62%
<b>NO</b>	Toya	25%	N/A	N/A	88%
<b>YES</b>	Ikaram	27%	29%	100%	86%
<b>NO</b>	Pampaida	20%	N/A	25%	60%
<b>YES</b>	Mayange	56%	78%	9%	91%
<b>NO</b>	Potou	28%	0%	0%	75%
<b>NO</b>	Mbola	19%	N/A	N/A	93%
<b>YES</b>	Ruhiira	99%	N/A	N/A	N/A

*CDR refers to the Case Detection Rate for the cluster*

*HIV Test refers to the percentage of TB patients tested for HIV*

*HIV + refers to the positivity rate of TB patients tested for HIV*

**CONCLUSIONS**

- Four sites surveyed reached the MDG target for TB treatment in 2008
- Five sites surveyed have reached higher treatment success rates than national average.
- Ruhiira, UGANDA reached the MDG target for diagnosis in 2008.
- More than half of the sites surveyed have reached higher case detection rates than the national average.
- Throughout the sites surveyed, treatment success rates are less heterogeneous (between 60% and 91%) than case detection rates (between 19% and 99%). Emphasis needs to be placed on case finding with strong screening procedures and reliable quality-controlled laboratories, ideally located within the cluster.

**RECOMMENDATIONS OF THE TB INITIATIVE FOR 2010**

<b>CLUSTER</b>	<b>RECOMMENDATIONS</b>
<b>Koraro</b>	<ol style="list-style-type: none"> <li>1. Review screening procedures and implement contact tracing</li> <li>2. 100% HIV testing in confirmed TB patients</li> </ol>
<b>Bonsaaso</b>	<ol style="list-style-type: none"> <li>1. 100% HIV testing in confirmed TB patients</li> <li>2. Increase Directly Observed Treatment and follow up of patients on TB treatment.</li> </ol>
<b>Sauri</b>	<ol style="list-style-type: none"> <li>1. 100% HIV testing in confirmed TB patients</li> <li>2. cotrimoxazole for TB patients with unknown HIV status</li> <li>3. Increase Directly Observed Treatment and follow up of patients on TB treatment</li> <li>4. 100% collection of last sputum after treatment completion</li> </ol>
<b>Mwandama</b>	<ol style="list-style-type: none"> <li>1. 100% HIV testing in confirmed TB patients</li> <li>2. Systematic cotrimoxazole for TB patients with unknown HIV status</li> <li>3. Screening of pediatric TB</li> </ol>
<b>Tiby</b>	<ol style="list-style-type: none"> <li>1. 100% HIV testing in confirmed TB patients</li> <li>2. 100% collection of last sputum after treatment completion</li> <li>3. Isoniazid Preventive Therapy for HIV+ and children under 5 living with a confirmed TB case</li> <li>4. Management of drug resistance</li> </ol>
<b>Toya</b>	<ol style="list-style-type: none"> <li>1. Review screening procedures and implement contact tracing</li> <li>2. Implement TB microscopy (through sputum collection and transport) within the cluster</li> </ol>
<b>Ikaram</b>	<ol style="list-style-type: none"> <li>1. Review screening procedures and implement contact tracing</li> <li>2. 100% HIV testing in confirmed TB patients</li> </ol>
<b>Pampaيدا</b>	<ol style="list-style-type: none"> <li>1. Review screening procedures and implement contact tracing</li> <li>2. Implement TB microscopy (through sputum collection and transport) within the cluster</li> <li>3. 100% HIV testing in confirmed TB patients</li> <li>4. Increase Directly Observed Treatment and follow up of patients on TB treatment</li> </ol>
<b>Mayange</b>	<ol style="list-style-type: none"> <li>1. Standardize screening procedures</li> <li>2. 100% collection of last sputum after treatment completion</li> <li>3. Screening of pediatric TB</li> </ol>
<b>Potou</b>	<ol style="list-style-type: none"> <li>1. Implement active case finding through CHWs</li> <li>2. Implement TB microscopy within the cluster</li> </ol>
<b>Mbola</b>	<ol style="list-style-type: none"> <li>1. Review screening procedures and implement contact tracing</li> <li>2. Implement TB microscopy (through sputum collection and transport) within the cluster</li> <li>3. 100% HIV testing in confirmed TB patients</li> </ol>
<b>Ruhiira</b>	<ol style="list-style-type: none"> <li>1. 100% collection of last sputum after treatment completion</li> <li>2. Isoniazid Preventive Therapy for HIV+ and children under 5 living with a confirmed TB case</li> <li>3. Management of drug resistance</li> </ol>

## Tuberculosis Initiative

- Dr. Annie de Groot (Brown University / GAIA Mali)
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*(Photo courtesy of Millennium Promise)*